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Parallel Infeasibility Analysis

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PARALLEL INFEASIBILITY ANALYSIS

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In the field of computer science, the constraint satisfaction problem is a commonly studied problem and has a wide range of applications such as microprocessor design verification and scheduling problems. A constraint system is a set of restrictions, known as constraints, that "restrict" the values can be assigned to those variables. For example, imagine scheduling a meeting with your professor: you are available from 7am to 2pm and your professor is available from 1pm to 4pm. This forms a simple constraint system. However, it is not always possible to satisfy all constraints in a constraint system. For example, if your professor is only available from 3pm-4pm, there is not a time that both of you are free. We then call it an infeasible constraint system. In addition to knowing it is infeasible, it is useful to extract more information. What makes it impossible to satisfy? Where are the issues? How could we fix them? In this work, we have improved on an existing algorithm that performs this type of analysis by parallelizing it, adapting it to run on multiple processors simultaneously. That is, within the same amount of time, we can gain more information by running the parallelization of the previous algorithm on a multi-core machine. Our empirical analysis shows the parallelized algorithm scales well, making efficient use of all cores in a system.